

Severe local hail and wind storms, July, 1926—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Lyman, Nebr. (4 miles south of)	23	4 p. m.	3,520		6,000	Hail	Damage over small area	Official, U. S. Weather Bureau.
Dalton, Nebr. (west of)	23	5 p. m.	1,760		5,000	do	do	Do.
Gothenburg, Nebr. (north of)	23	5-7 p. m.	2,640		12,000	do	do	Do.
Valley County, Nebr. (eastern part of)	23	6 p. m.	20 mi.		25,000	do	Much damage in places. Path 25 miles	Do.
Rockingham County, Va. (western part of)	23	P. m.	20 mi.		100,000	Thunderstorm and hail.	Crops badly beaten by hail; buildings damaged by wind.	Do.
Chester County, Pa.	24	10 a. m.				Thunderstorm and wind.	Heavy property and crop loss reported	Do.
Alleghany County, Md.	24	p. m.				Destructive hail.	Character of damage not reported	Do.
Oshoto (near), Wyo.	24		3,520		8,000	Hail.	Crops and gardens ruined; trees stripped.	Do.
Charleston, Ill., and east of	25	12.30-2 p. m.	1,760			Wind and hail.	Church damaged; 50 per cent crop loss on 200 acres.	Do.
Yoder, Wyo.	25		1,760			Hail.	Small grain damaged 80 to 90 per cent; minor damage to other crops.	Do.
Chacon, N. Mex.	26	3 p. m.	880-1,760			Heavy hail.	Crops injured	Do.
Chattanooga, Tenn.	26-27				1,500	Thunderstorm	Streets and roads flooded; telephone service impaired.	Do.
Boone, Calhoun, Webster, Hamilton, Pocahontas, and Wright Counties, Iowa.	27				861,800	Hail.	Damage principally to crops; some poultry killed.	Do.
East coast of Florida	27-28			1	3,051,000	Tropical hurricane	Some groves damaged; large quantity of fruit lost; heavy damage to buildings and celery crop.	Do.
Greene, Hamilton, and Keokuk Counties, Iowa.	28				40,000	Hail.	Crops damaged about 50 per cent. Storms usually occurred in the morning.	Do.
Orangeburg, S. C.	28				2,000	Wind.	Rural residences demolished.	Do.
Wedgefield, S. C.	28					Tornado	Minor damage reported	Do.
Wilmar, Minn.	28					Hail and wind	Crops injured, other minor damage	Do.
Mount Carroll, Ill.	29	6.16-7.15 a. m.			1,100	Electrical	Electric lines damaged	Do.
Franklin County, Iowa	29	6 p. m.	3,520			Hail.	Crop loss about 50 per cent; path 4 miles	Do.
Dunn, N. C.	29					Wind and rain	Crops, trees, and a few small houses damaged	Do.
Redwood Falls, Minn.	29					Wind.	Some damage over limited area	Do.
Ottawa, Ill.	30	2.30 p. m.				Wind, rain, and electrical.	Trees blown down; much damage by flooding: 800 telephones out of order; car service suspended.	Do.
Peoria, Ill., and vicinity	30					Electrical.	A few barns burned	Do.

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STORMS AND WEATHER WARNINGS

WASHINGTON FORECAST DISTRICT

The tropical disturbance that appeared east of the Leeward Islands on the 22d and passed near the island of Dominica during the following night, apparently as a storm of only moderate intensity, increased gradually in intensity as it moved west-northwestward south of the Virgin Islands and Porto Rico, San Juan reporting a maximum wind velocity of 66 miles an hour from the east on the 23d. The lowest barometer reading at San Juan was 29.70 inches, the storm center apparently passing close to the extreme southwestern part of Porto Rico the evening of the 23d as the path changed from west-northwest to northwest. The morning report of the 24th from Santo Domingo was missing, but the Port au Prince and Puerto Plata reports indicated that the center was a short distance south of Santo Domingo. However, the delayed morning report was received late in the afternoon of the 24th and it showed that the storm center had already passed the extreme eastern point of the island and was moving northwestward along or near the coast line.

In the advisory warnings sent out up to and including the morning of the 24th the direction of movement of the storm was given as west-northwest, but caution was advised for all vessels bound for the region south of latitude 25° N., which is the latitude of Nassau, Bahamas, and on the morning of the 24th this area was extended to include the Bahama Islands and neighboring waters. Upon receipt of the delayed morning report from Santo Domingo the following advisory warning was sent out:

Advisory, 5 p. m. (24th).—Tropical storm will likely pass between Turks Island and Great Inagua to-night, moving northwestward or west-northwestward. No further danger in Caribbean Sea.

At 8 p. m. the barometer at Turks Island read 29.68 inches, and the wind which had reached a maximum

velocity of 74 miles an hour from the northeast had shifted to southeast and decreased to 38 miles an hour. The following warning was issued at 10 p. m. of the 24th:

Hoist northeast storm warning Jupiter Inlet to Key West, Fla. Hurricane central between Turks Island and Inagua moving northwestward. Center will probably pass near Nassau early Sunday night. Increasing northeast winds along southeast Florida coast becoming strong Sunday afternoon or night. Caution advised all vessels bound toward hurricane's path.

At 8 a. m. of the 25th the barometer at Nassau had scarcely begun to fall, and the weather was clear with only 6 miles of wind from the northeast. The S. S. *Standard*, however, in latitude 24 N. and longitude 74° 30' W., reported a barometer reading of 29.86 inches with a wind velocity of 50 miles from the east. At noon the barometer on this vessel read 29.56 inches and the wind had increased to 70 miles an hour from the northeast. By 8 p. m. the pressure at Nassau had fallen to 29.78 inches and the wind which was 34 miles an hour from the northeast at 4 p. m., had increased to 60 miles from the same direction. The following warning was issued:

Continue northeast storm warnings 10 p. m. Key West to Jupiter Inlet, Fla. Hurricane central about twenty-four north, seventy-six west moving northwestward toward Nassau. * * * Increasing northeast winds probably becoming strong Monday forenoon, especially between Jupiter and Miami. Caution advised all vessels off the east Florida coast.

No further reports were received from Nassau, where the hurricane was very severe. Unofficial reports indicated that the wind reached an estimated velocity of 135 miles an hour at that place. At 2 p. m. of the 26th, the S. S. *West Erral*, only a short distance east of Miami, reported a wind velocity of 70 miles an hour from the northeast with a rough sea. At 3.30 p. m., the following warning was issued:

Change to hurricane warnings Jupiter Inlet to Key West, Fla., and hoist northeast storm warnings north of Key West to Tampa.

Hurricane apparently central two p. m. approximately twenty-five north seventy-nine west moving west-northwestward. Indications are hurricane will move inland over extreme southern Florida late this afternoon or early to-night. Advise all interests.

The hurricane continued to move slowly northwestward and at 8 a. m. of the 27th it was central a short distance off the coast between Miami and Jupiter Inlet. A vessel, name unknown, between Cary's Fort and Bimini reported a barometer reading of 29.01 inches with winds of hurricane force and tremendously high waves at 5 a. m. This report was received several hours late. A delayed report from the S. S. *Orizaba* not far from the center showed a pressure of 29.20 inches with a wind force of 12 (Beaufort) from the north. The hurricane warnings were changed to northwest storm warnings at 10 a. m. from Key West to Miami, and northeast storm warnings were ordered north of Titusville to Charleston, S. C. At noon the following warning was issued:

Extend hurricane warnings one p. m. northward along east Florida coast to Jacksonville. Hurricane center apparently near Palm Beach moving slowly north-northwestward. * * * Emergency. Advise all interests.

At 3.40 p. m. the following warning was issued:

Hoist northeast storm warnings sunset north of Tampa to Cedar Keys and north of Charleston to Virginia Capes. Hurricane central two p. m. vicinity of Palm Beach or Jupiter, Fla., apparently moving slowly north-northwestward. S. S. *Orizaba* near hurricane center reports wind velocity hundred miles per hour.

At 9.20 p. m. the following warning was sent out:

Change to hurricane warnings ten p. m. north of Jacksonville to Charleston. Hurricane central along east Florida coast at latitude twenty-eight apparently moving north or north-northwestward. Center will pass near Titusville during the night and likely pass short distance east of Jacksonville Wednesday morning. Emergency. Advise all interests.

Northwest storm warnings were ordered displayed along the northwest Florida coast from Cedar Keys to Apalachicola at 9.30 a. m. of the 28th, and the following advisory warning was issued:

Hurricane central eight a. m. along northeast Florida coast between Titusville and Jacksonville, moving very slowly north-northwestward. Center will pass close to Jacksonville to-day and quite likely move northward near or inside the Georgia coast line.

The center passed very close to Jacksonville at about 3 p. m., when the barometer read 29.25 inches. Thereafter, the storm decreased in intensity quite rapidly, Macon, Ga., reporting 29.60 inches at 8 a. m. of the 29th, when the center was near that place. An area of high pressure that extended from Bermuda northwestward over the Middle Atlantic and North Atlantic States caused the path of the storm to be deflected toward the west. No strong winds attended the westward advance of the disturbance, which was now of only moderate intensity, as it moved over western Georgia, Alabama, and Mississippi. By 8 p. m. of the 31st the center was between Memphis, Tenn., and Cairo, Ill., after which the disturbance moved northeastward over Indiana and the lower lake region to western Quebec, where it was central the evening of August 2.

Apparently little damage was done by this tropical storm until it reached Porto Rico. The official in charge at San Juan reports as follows:

The storm caused considerable injury to crops in Porto Rico, the heaviest losses occurring in the west-central region of coffee plantations. About 25 lives were lost, mostly due to heavy floods caused by the rapid rise of the rivers. The rainfall was very heavy, especially in the mountain regions. The average rainfall of the island during the storm was 6.18 inches. The normal amount for the entire month of July is 6.50 inches.

A rough survey of losses reported by correspondents of the Climatological Service shows:

Lives lost.....	25
Losses to crops by—	
Wind.....	\$1, 000, 000
Water.....	1, 000, 000
Other losses by—	
Wind.....	200, 000
Water.....	150, 000
Total property loss.....	2, 350, 000

In eastern Santo Domingo the estimated damage amounted to \$3,000,000, and at Turks Island, where the wind reached a velocity of 74 miles an hour from the northeast, some property damage was done, but no loss of life has been reported.

The hurricane increased in intensity as it advanced northwestward over the Bahama group. A copy of the Nassau Guardian of July 28 was received through the State Department from the American vice consul at Nassau and an excellent description of the hurricane, taken from that paper, is printed on page 296 of this REVIEW.

Almost a page of the Guardian was devoted to detailed accounts of damage to Government buildings, churches, hotels, private homes, shipping, and telegraph and telephone lines. The wireless station went out of commission early on Sunday evening, July 25. The two new steel towers which had just been erected snapped and fell to the ground. The old towers also snapped near the top at practically the same height. No reports of loss of life in the Bahamas had been received up to the time the newspaper went to press, and no estimate was given of the approximate monetary damage, but it is doubtless very great.

The information given below is taken from the report of the official in charge, Jacksonville, Fla.

Damage to property in Florida by the hurricane is estimated as follows: Fort Pierce, \$30,000; Cocoa, \$50,000; Stuart, \$100,000; and Palm Beach, West Palm Beach, and Lake Worth (combined), \$2,000,000 to \$3,000,000. At New Smyrna there was very great damage to property and about \$10,000 damage to telegraph and telephone lines. Damage to crops was rather severe in the vicinity of all the places mentioned above. Stuart reports the loss of 80 per cent of the fruit crop; Fort Pierce, 50 per cent of the grapefruit and 10 per cent of the orange crop; and Cocoa reports crop losses amounting to \$300,000.

Other than damages to sea walls and inundations to property exposed to the high seas the marine damage on the east coast was of little moment—due, without question, to the advance warnings of the bureau and to the implicit obedience to them. Six lives were reported lost on a fishing boat that left Apalachicola on the 22d, before the first warning of the storm was received at that place, and failed to return after the storm had passed. One life was lost at Palm Beach.

Frequent readings of the aneroid barometer were made during the progress of the hurricane at both Fort Pierce and Merritts Island (10 miles south of Titusville). At Fort Pierce the lowest reading was 28.88 inches at 4.30 p. m. of the 27th, and at Merritts Island 28.80 inches at 11.30 p. m. of the same date. Inasmuch as the distance between the two places is slightly over 70 miles, the rate of progression of the hurricane center was approximately 10 miles an hour. No estimate was made of the wind velocity at any point between Miami and Jacksonville, except at Titusville, where it was from 60 to 70 miles an hour. At Jacksonville the maximum velocity was 50 miles an hour from the east. As is usual, torrential rains attended the northward progress of the hurricane. The greatest 24-hour amounts were as follows: Jacksonville, 5.66; Sanford, 6.30; Malabar, 6.85; Fellsmere, 6.88; Titusville, 8.36; and Merritts Island, 10.02 inches.

The official in charge during his experience in 20 or more tropical storms has rarely seen such implicit obedience to the display of hurricane warnings. No ship, however staunch, wished to challenge the storm's fury, and one passenger ship returned to port after a short contest with high winds and mountainous seas. It is unquestionably true that the small property loss, as well as the small loss of life afloat, was due to the alertness in the distribution of warnings and a general observance of the same by all concerned. Expressions of appreciation and complimentary remarks on the efficiency of the bureau have been of frequent occurrence.

The official in charge at Miami reports as follows:

The damages in the Miami district from the storm amounted to about \$150,000, the greater part of which represents the loss to the avocado crop. The next greatest loss was sustained by telegraph, telephone, and electric light companies. A considerable loss also resulted from the destruction of awnings. Several houseboats and barges on Biscayne Bay that had not been taken to safe anchorage were sunk. Most of the craft in Biscayne Bay, including large dredging equipment, heeded the Weather Bureau warnings and escaped injury. Owing to the poor exposure of the anemometer at this station, the maximum wind velocity recorded, 33 miles per hour, does not represent the true wind velocity. It is estimated that the wind reached a velocity of 50 miles per hour on Biscayne Bay and at Miami Beach.

Very little damage was done by the storm after it passed north of Jacksonville. At Charleston, S. C., a few small boats were sunk, signs were blown down, and a few plate-glass windows were broken.

No other storm of marked intensity crossed the Washington forecast district during the month.—*C. L. Mitchell.*

CHICAGO FORECAST DISTRICT

The few special weather warnings issued in July, 1926, concerned shipping interests on the Great Lakes, with the exception of a warning for possibly light frost in the cranberry districts of Wisconsin on the 12th. The frost warning was verified at two of the three special cranberry stations, and the third station reported a bog minimum temperature of 33°. Advices were also sent to the cranberry interests on the 10th and 13th to the effect that while low temperatures would prevail on those nights frost was not likely. The ensuing conditions occurred as forecast.

Four disturbances of more or less importance affected the Great Lakes during the month. A few winds of storm force occurred in this connection, but they were mainly thundersqualls or winds resulting from a sudden shift as the center of the disturbance passed the meridian of the station. In all cases the duration was brief. Except in one instance, small-craft warnings were issued for these disturbances. The exception was a storm warning for extreme western Lake Superior on the night of the 8th, when the first disturbance of the month was approaching the Great Lakes. This was a slow-moving storm from the northwest that steadily deepened as it advanced, so that when the upper Mississippi Valley was reached the barometer had fallen to an unusually low point for midsummer. In fact, the lowest reduced pressures of record for July occurred over a wide area. At Chicago the reading was 29.42 inches.

Special service was given in connection with the national balloon race held on the 13th at Chicago, at the time of the Elks National Convention, and we have been advised that the winner owed his success to using the weather reports and forecasts that were furnished each of the pilots.—*C. A. Donnel.*

NEW ORLEANS FORECAST DISTRICT

Moderate weather conditions prevailed throughout the district during the whole month. No storm warnings were issued and no general storm occurred on the west Gulf coast.—*I. M. Cline.*

DENVER FORECAST DISTRICT

The usual midsummer moderately low pressures prevailed over most of the Rocky Mountain region during the greater part of the month, with frequent generally light showers and thunderstorms, especially in the northern and eastern portions of this district.

Daily weather and temperature forecasts which contained predictions as to wind direction and velocity in New Mexico and Arizona were sent to the district forester, Albuquerque, N. Mex., from the 1st to the 15th, inclusive, and wind forecasts during the same period were included in the forecast telegram to the official in charge, Santa Fe, N. Mex. Daily forecasts of weather, temperature, and wind direction and velocity for western Montana were also sent to the official in charge, Spokane, Wash., to be used in forest-protection work.

No special warnings were required during the month.—*J. M. Sherier.*

SAN FRANCISCO FORECAST DISTRICT

The month was marked by a continuation of temperatures above the normal over practically all interior sections and by subnormal precipitation. Consequently, many warnings for fire-weather conditions in the forests were issued. Fires were frequent as a result of the prevailing wind, temperature and humidity conditions. Many of them were man-made but a number were caused by electrical discharges in the forested areas in the mountains. No storm warnings were issued; none were required.

The demand for citrus fruits during the summer months is largely governed by the weather conditions. A warm wave over the Middle Western and Eastern states, the principal consuming sections, brings about a greatly increased demand for lemons and oranges. Naturally the California Citrus Growers Exchange is interested in information of impending hot waves over these areas, in order to meet this increased demand. On the 16th the following information was sent to Mr. E. G. Dezell, general manager of this organization: "Weather chart indicates several days of warm weather over Middle Western and Eastern States." Acknowledging receipt of this advice, Mr. Dezell on the same date wrote as follows:

Thank you very much indeed for your flash wire this morning with reference to the indications for several days of warm weather over the Middle Western and Eastern States. This changes last week's forecast and is very acceptable from the standpoint of the market of both lemons and oranges and this early advice is very much appreciated.

—*E. H. Bowie.*

RIVERS AND FLOODS

By H. C. FRANKENFIELD

The only floods of importance during July were those in the Sulphur River. Intermittent rains following the 8th at intervals of a few days kept this stream near or above the flood stage at Ringo Crossing, Tex., from the 10th, and at Finley, Tex., from the 18th, to the close of